Prevention and control of infections in the hospital environment: Occupational health and safety

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ABSTRACT

Introduction: The correct performance and expanded knowledge of health professionals are essential due to the high incidence and complications of nosocomial infections, which can delay the patient's recovery and increase the risk of nosocomial infection. This problem is one of the great challenges of public health in Brazil and must be managed competently to ensure patient safety and care in health units.
Objective: This study aims to disseminate knowledge and encourage the correct practice of hand hygiene, the proper use of Personal Protective Equipment (PPE) and hospital cleaning, reflecting on health and safety at work in the prevention and control of infections in the hospital environment.
Methodology: This is a bibliographic review, of a narrative, exploratory and descriptive nature, based on scientific articles indexed in Google Scholar and in the Virtual Health Library (VHL) platform, using the PubMed and Scientific Electronic Library Online (SciELO) databases. Conclusion: Nosocomial infection represents a major challenge for public health, exposing patients to possible infections caused by bacteria and microorganisms, sometimes acquired due to the patient's own low immunity and resistance or due to failures in infection control processes and biosafety measures.

Keywords: Occupational safety, Hospital infection, Infection control.

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INTRODUCTION

Hospital infection is characterized by an infection acquired after the patient's admission to a hospital environment, and can manifest itself both during the hospitalization period and after discharge (Oliveira et al., 2019; Nahum et al., 2021). These infections are worrisome for patients, as they cause complications, high costs, increase the length of stay in hospitalizations and increase the hospital mortality rate, being considered a serious public health problem.

The occurrence of nosocomial infections (HAIs) is related to the exposure of patients to a variety of infectious agents and pathogens, as well as to the performance of invasive procedures and the use of antimicrobials, which favor their development (Oliveira et al., 2018).

Globally, it is estimated that for every 10 patients, 1 acquires a hospital-acquired infection (WHO, 2020). In Brazil, the infection rate is 14% (BRASIL, 2019), where with an infection incidence of 10/1,000 patients with mechanical ventilators, 3.9/1,000 with central catheters, and 3.6/1,000 with indwelling urinary catheters (ANVISA, 2021).

Among the main measures to prevent HAIs, proper hand hygiene, sterilization of equipment, and careful procedures stand out, which are essential to reduce the incidence of these infections (Lopes *et al.,* 2020). Hand hygiene is considered the most effective, simple, and powerful measure to prevent pathogens (Silva; Pear tree; Souza, 2021).

Hospital infections represent a major challenge for health systems, highlighting the need for effective prevention measures, such as the introduction of more effective hygiene protocols, continuous training of health professionals in order to mitigate and avoid the spread of infections that can aggravate and lead to the fatal clinical evolution of patients. Thus, the present study aims to disseminate knowledge and encourage the correct practice of hand hygiene, the appropriate use of Personal Protective Equipment (PPE) and hospital cleaning, reflecting on health and safety at work in the prevention and control of infections in the hospital environment.

METHODOLOGY

This is a bibliographic review, of a narrative, exploratory and descriptive nature, which seeks to reflect on occupational health and safety in the prevention and control of infections in the hospital environment, contributing to discussions on research methods and results. Articles were searched in the national and international literature.

For data collection, consultations were carried out in the Virtual Health Library, Google Scholar, PubMed, and Scientific Electronic Library Online (SciELO) in the last 10 years, using the descriptors: "hospital infection", "hospital care" and "occupational safety".

Regarding the ethical aspects, this research used secondary data in the public domain, offering no risks to the participants. Therefore, there was no need to submit it to the Ethics

Committee, according to item III of resolution 510/2016, there was no need for the research ethics committee to consider the project.

THE IMPORTANCE OF OCCUPATIONAL SAFETY IN THE HOSPITAL ENVIRONMENT

The hospital environment is a complex place that, when well organized, includes determining factors for the occurrence and prevention of occupational accidents (WA). For its effective functioning and accident prevention, the availability of material resources and equipment, the adequate number of workers, and the behavioral aspects of health professionals and managers are essential (Fontana; Lautert, 2013; Soares et al., 2013).

The activities carried out in the hospital environment expose professionals to several risk factors, such as exposure to biological agents, including viruses, bacteria and fungi, which can occur through direct contact with blood and other body fluids or through airborne transmission. In addition, chemical substances, such as cleaning products, medications, and anesthetics, also pose risks, and can cause dermatitis, respiratory problems, and even poisoning when handled improperly. Ergonomic risks, resulting from repetitive movements and inadequate postures, can result in musculoskeletal disorders. Finally, physical risks, such as exposure to ionizing radiation, loud noise, and extreme temperatures, are common in radiographs, operating rooms, and intensive care units (Penna et al., 2010).

Occupational safety in hospital environments is an extremely relevant topic due to its complexity and inherent risks. Therefore, it is crucial that biosafety measures are strictly followed by professionals in the hospital sector, ensuring the safety of both patients and professionals (Luz; Beretta, 2016).

In this context, the need arose to create standards and regulations to ensure the safety of professionals who work in the hospital environment, mitigating the main risks to which they are exposed daily. The biosafety area was developed to address the problems caused by chemical, physical, biological, ergonomic and psychosocial agents in occupational health and laboratory environments (Costa; Costa, 2007).

With the emergence of genetic engineering in the 1970s, the concept of biosafety gained prominence, especially after the transfer and expression of the insulin gene to the bacterium Escherichia coli. This advance culminated in the Asilomar Conference in 1974, which discussed the risks and safety of genetic engineering (Albuquerque, 2001; Borém, 2001).

The biosafety standards of the National Institute of Health (NIH) of the USA emerged from this conference, highlighting the importance of safety in recombinant DNA technology and alerting the scientific community about the need for regulations (Almeida; Valle, 1999). In the 1980s, the World Health Organization (WHO) conceptualized biosafety as prevention practices for laboratory

work with pathogenic agents, classifying risks as biological, chemical, physical, radioactive, and ergonomic (Costa; Costa, 2002).

In Brazil, debates about the risks of carrying out scientific work, especially in laboratories, date back to the nineteenth century, but biosafety was structured in the country between the 1970s and 1980s, motivated by several reports of infections in laboratories (Almeida; Albuquerque, 2000; Shatzmayr, 2001). In 1995, the National Technical Commission on Biosafety (CTNBio) was created, linked to the Ministry of Science and Technology, to establish standards for activities involving genetically modified organisms and to promote health in the workplace (Scholze, 1999; Garcia; Zanetti-Ramos, 2004).

In addition to CTNBio, the Health Biosafety Commission (CBS) was created in 2002, linked to the Ministry of Health, with the objective of defining strategies for action, evaluation and monitoring of biosafety actions, seeking a better understanding between the Ministry of Health and the institutions that deal with the theme (Brasil, 2006).

With the advancement of debates on biosafety, there was a need to regulate occupational safety in health services, resulting in the creation of Regulatory Standard 32 (NR 32). This standard establishes guidelines for the protection of workers in health services, requiring the implementation of environmental risk prevention programs, the availability of PPE and the promotion of continuous education on safe practices (Brasil, 2011).

Forms of prevention related to biosafety include hand washing, use of personal protective equipment, cleaning and waste management, and proper disposal of materials. In situations of risk, specific protection, adequate working conditions and continuous professional training are necessary (Brasil, 2011).

Training and professional qualification are essential to ensure safety in the hospital environment, especially in the correct use of PPE, handling of chemical and biological substances, and emergency procedures. The training enables greater knowledge of protection measures, mitigating risks. In addition, it is necessary to provide professionals with adequate personal protective equipment and implement physical barriers, such as biological safety hoods and ventilation systems, to significantly reduce exposure to hazardous agents (Silva Pires et al., 2019).

Proper waste management, addressed in NR 32, is essential to prevent environmental contamination and the exposure of workers to hazardous materials. Biological, chemical and radioactive waste must be managed in accordance with specific regulations to ensure that it does not pose a risk to public health and the environment (Brasil, 2005).

In addition to NR 32, other biosecurity measures adopted by health facilities include safety protocols, equipment maintenance and calibration, and emergency plans (Silva et al., 2020). Occupational safety in the hospital environment is complex and fundamental to ensure the health and

well-being of professionals and the quality of care provided to patients. The implementation of preventive measures, following standards such as NR 32, is essential to mitigate existing risks and ensure a safe and efficient environment (Andrade; Silva; Netto, 2015). Top of the form.

INFECTION PREVENTION AND CONTROL IN HOSPITALS

Health care has been evolving over time, bringing great scientific and technological advances, as well as improvements in health actions and services, however, despite the technical-scientific growth, the persistence of nosocomial infections (HI) continues to be a significant problem (Andrade D, 2000).

Hospital-acquired infections have long been a concern among government agencies. Even with the regulation and creation of several Hospital Infection Control Committees (HICC) in Brazilian hospitals in the 1980s, they are still neglected, becoming a challenge for Brazilian public health (Mendonça et al., 2003).

HI is acquired after the patient is admitted for hospitalization, and may occur during their stay in the hospital or after discharge. It is directly associated with the hospital procedures performed or with the hospitalization itself, due to the range of invasive procedures and the use of antimicrobial therapies, which make the hospital environment conducive to the development of bacteria, some of which may be resistant, thus increasing the rates of hospital infections (BRASIL, 1998; COSTA et al., 2021).

According to the Ministry of Health, HAIs affect an average of 1.5 million patients worldwide, with 10% showing signs of infection after discharge and 15 to 50% of these cases evolving to death. In Brazil, hospital infection rates represent 5% to 14% of total hospitalizations. These infections result from the interaction between pathogenic agents (microorganisms or their toxins), the host (patient) and the hospital environment, manifesting themselves by signs and symptoms such as fever, weakness, pain in the affected site and changes in laboratory tests (SÃO PAULO, 2005; DA SILVA, 2020).

HAIs are more common in patients with weakened immune systems, who have undergone invasive procedures, who have metabolic and hematologic disorders, or who are using immunosuppressive drugs. The risk is higher in newborns and the elderly. The length of stay in the hospital unit is also related to the increased risk of NI due to immunological fragility and the need for invasive procedures (Padoveze, 2019).

Currently, the term "hospital-acquired infection" is being replaced by "healthcare-associated infections" (HAIs), which is more comprehensive. HAIs are infections acquired during the provision of health care, including outpatient procedures, home care, and infections acquired by health care workers. The main measure for the control of HAI is correct hand hygiene. Controlling infections is

essential to ensure the quality of the service and care provided (BRASIL, 1998; COSTA et al., 2021; SILVA et al., 2024; Rossi Neto, 2004; DA SILVA, 2020).

The National Health Surveillance Agency (ANVISA) treats HAI as infectious processes acquired in any health institution. In addition to being caused by care deficiencies and the patient's condition, HAI also result from operational failures in the process of cleaning, disinfecting and sterilizing medical and hospital articles, performing invasive procedures, preparing parenteral medications, irrational use of antimicrobials and inadequate hand hygiene of health professionals (Rossi Neto, 2004; DA SILVA, 2020).

Correct hand hygiene before, during, and after each care provided to the patient must be done in accordance with established sanitary criteria, such as the use of bacteriostatic detergent in running water and proper hand drying, avoiding spread or cross-contamination. This simple gesture can eliminate common bacteria, using the correct antiseptic (BOTELHO et al., 2021).

In order to more effectively instrumentalize sanitary inspection actions in the control of HAIs, ANVISA issued Resolution RDC No. 48/2000, which establishes the evaluation/inspection process of Hospital Infection Control Programs, and Ordinance No. 2,616/1998 of the Ministry of Health, which organizes and defines the competencies of the Hospital Infection Control Commission (CCIH) and the Hospital Infection Control Program (PCIH), establishing concepts, epidemiological criteria, indicators and recommendations.

Despite these measures, there is low adherence to health guidelines for infection control and biosecurity measures. Researchers point out that the implementation of these guidelines can occur in a non-uniform way, with discrepancies in the published requirements. Therefore, it is essential to carry out structural and process assessments, in addition to investing in continuing education for the prevention of infections in the hospital environment (Giroti, 2018; Stone, 2014; Couto, 2020).

Another crucial aspect is hospital cleaning, which prepares the environment for daily activities, removing organic dirt and pathogens, minimizing bacterial colonization and infections. Proper cleaning promotes safety and comfort for both patients and healthcare providers (Paina et al., 2015).

To perform hospital cleaning correctly, the responsible professionals – general service assistants – need to be properly trained. However, studies indicate that these professionals often do not receive the necessary training, are unaware of the sanitizers used and do not use the recommended personal protective equipment (PPE). An inadequately sanitized hospital environment poses a significant risk for HAI (BEZERRA, 2024).

Therefore, analyzing the importance of prevention and control of hospital infections, through the awareness of the population and health professionals about hand hygiene and hospital cleaning, is essential for the prevention of healthcare-associated infections (HAIs). This not only reduces the risk

of infections but also promotes safety and well-being in hospital facilities (Silva et al., 2023; BEZERRA, 2024).

CONCLUSION

It is concluded that nosocomial infection represents a significant challenge for public health, exposing patients to infections caused by bacteria and microorganisms. These infections can occur due to low immunity and resistance of patients or due to failures in infection control processes and biosecurity measures. It is essential to emphasize the correct use of prevention measures, such as proper hand hygiene, the rational use of antibiotics, the correct use of PPE, and the proper cleaning of the hospital environment, in order to minimize contamination rates.

The continuous approach to this theme is essential to disseminate knowledge and updates, especially among health professionals. The education and training of these professionals are crucial to reduce complications and promote safety in the hospital environment.

Additionally, implementation and strict adherence to infection control protocols are vital to creating a safer environment for patients and staff. Constant studies and monitoring are needed to identify areas for improvement and develop effective prevention strategies.

Finally, collaboration between hospital managers, healthcare professionals, and regulatory bodies is imperative to ensure that best infection control practices are adopted and maintained. Only through a joint effort will it be possible to significantly reduce the incidence of hospital infections and improve the quality of care in hospitals.

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